

A comparative assessment of sequential combined spinal epidural anesthesia versus epidural volume extension in patients undergoing lower limb orthopaedic surgery

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ABSTRACT:

Background: In today's anesthetic practice, combined spinal epidural (CSE) anesthesia is widely used. It offers postoperative analgesia, a quick start, a lengthy duration, and a lower risk of local anesthetic toxicity. The present study compared sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery. **Materials & Methods:** 50 patients scheduled for lower limb orthopaedic surgery of both genders were divided into 2 groups of 25 each. Group I was sequential combined spinal epidural (SCSE) group and group II was epidural volume extension (EVE) group. Parameters such as anesthesia readiness time, modified bromage motor score, duration of motor block, time for sensory regression to T12 was recorded in both groups. **Results:** The mean duration of surgery was 126.2 minutes in group I and 120.8 minutes in group II. The mean duration of motor block was 175.2 minutes in group I and 147.2 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II. The mean modified bromage motor score was 2 in group I and 1 in group II. The difference was significant ($P < 0.05$). Number of patients who required pethidine was 6 in group I and 4 in group II. The mean pethidine consumption (mg) was 4.2 mg in group I and 3.3 in group II. The mean time for sensory regression to T12 was 134.2 minutes in group I and 123.2 minutes in group II. Supplementation with general anesthesia was 1 minute in group I and 2 minutes in group II, time to first request for postoperative analgesia was 225.6 minutes in group I and 190.1 minutes in group II. The difference was significant ($P < 0.05$). **Conclusion:** Both SCSE and EVE techniques are effective in patients undergoing lower limb orthopedic surgery.

Key words: Combined spinal epidural, orthopaedic surgery, general anesthesia

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INTRODUCTION

In today's anesthetic practice, combined spinal epidural (CSE) anesthesia is widely used. It offers postoperative analgesia, a quick start, a lengthy duration, and a lower risk of local anesthetic toxicity.¹ Because they have less cardiorespiratory reserve and other comorbidities, elderly individuals undergoing major orthopedic surgery are far more vulnerable than younger patients. While spinal anesthesia is a rapid and easy method, there is a chance that it can cause severe hypotension.² A modified kind of anesthetic known as sequential combination spinal epidural (SCSE) uses a minimal spinal dose insufficient for operation to try and reduce the incidence of hypotension. The block is then extended cephalad with the epidural medication. This method is becoming well-known in the field of obstetric anesthesia, but it can also be applied to patients having orthopedic surgery because.³

A modified kind of anesthetic known as sequential combination spinal epidural (SCSE) uses a minimal spinal dose insufficient for operation to try and reduce the incidence of hypotension. The block is then extended cephalad with the epidural medication. Because of its hemodynamic stability, this method is

becoming more and more well-known in the field of obstetric anesthesia, but it can also be applied to patients having orthopedic surgery.⁴

An additional modified CSE technique is epidural volume extension (EVE). Using regular saline into the epidural area right away following the intrathecal injection of the local anesthetic is part of this method.⁵ The possibility that the spinal needle helps with accurate epidural space identification is another theory put out to explain the higher success rate of the CSE procedure. When employing a needle-through-needle CSE approach, a spinal needle with a sufficient CSF return indicates that the Tuohy needle should be positioned correctly in the epidural area.⁶ The present study compared sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery.

MATERIALS & METHODS

The present study consisted of 50 patients scheduled for lower limb orthopaedic surgery of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 25 each. Group

I was sequential combined spinal epidural (SCSE) group and group II was epidural volume extension (EVE) group. Parameters such as anesthesia readiness time, modified bromage motor score, duration of motor block, time for sensory regression to T12, supplementation with general anesthesia, time to the

first request for postoperative analgesia, number of patients who required pethidine and mean pethidine consumption was recorded in both groups. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Baseline characteristics

Parameters	Group I	Group II	P value
Duration of surgery (min)	126.2	120.8	0.12
Duration of motor block (min)	175.2	147.2	0.01
Anesthesia readiness time (min)	20.1	18.5	0.05
Modified Bromage motor score	2	1	0.02

Table I, graph I shows that mean duration of surgery was 126.2 minutes in group I and 120.8 minutes in group II. The mean duration of motor block was 175.2 minutes in group I and 147.2 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II. The mean modified bromage motor score was 2 in group I and 1 in group II. The difference was significant (P< 0.05).

Graph I Baseline characteristics

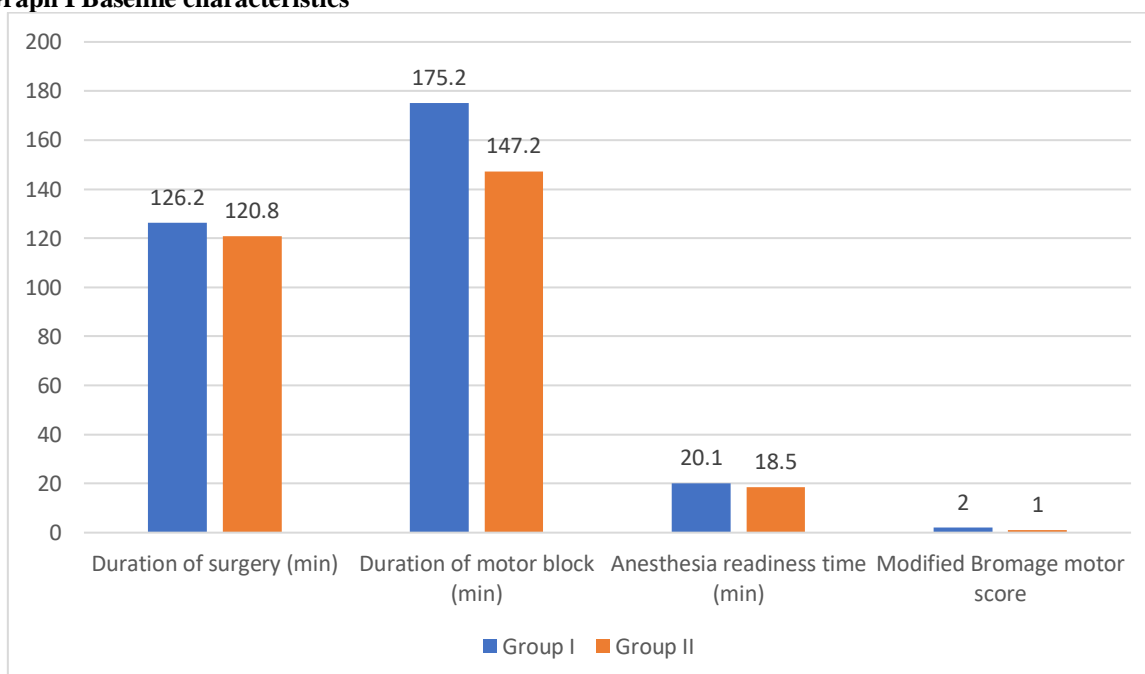


Table III Assessment of parameters

Number of patients who required pethidine	6	4	0.91
Mean pethidine consumption (mg)	4.2	3.3	0.88
Time for sensory regression to T12 (min)	134.2	123.2	0.05
Supplementation with general anesthesia(min)	1	2	0.04
Time to first request for postoperative analgesia	225.6	190.1	0.05

Table II shows that number of patients who required pethidine was 6 in group I and 4 in group II. The mean pethidine consumption (mg) was 4.2 mg in group I and 3.3 in group II. The mean time for sensory regression to T12 was 134.2 minutes in group I and 123.2 minutes in group II. Supplementation with general anesthesia was 1 minute in group I and 2 minutes in group II, time to first request for postoperative analgesia was 225.6 minutes in group I and 190.1 minutes in group II. The difference was significant (P< 0.05).

DISCUSSION

In today's anesthetic practice, combined spinal epidural (CSE) anesthesia is widely used. It offers postoperative analgesia, a quick start, a lengthy duration, and a lower risk of local anesthetic toxicity.⁷

Because they have less cardiorespiratory reserve and other comorbidities, elderly individuals undergoing major orthopedic surgery are far more vulnerable than younger patients. Inadequate sacral spread and partial sensory blockage have been linked to epidural

anesthesia. It does, however, permit gradual dosage, and with it, sporadic evaluation of the degree of sensory blocking and blood pressure variation.⁸ When compared to epidural anesthesia alone, a CSE with a low-dose spinal anesthetic can reliably produce dense, non-patchy sensory blocking with enhanced sacral distribution and comparable stable hemodynamics. Understanding how the thecal sac and the epidural space interact is necessary for using the CSE procedure properly. The thecal sac may compress as a result of increased pressure in the epidural compartment following the administration of an epidural fluid bolus. The intrathecal area may experience greater cephalad dispersion of the spinal anesthetic during CSE as a result of thecal sac compression and epidural bolus injection.⁹ The term epidural volume extension (EVE), epidural volume expansion, or epidural top-up refers to this volume-based phenomenon.¹⁰ It appears that improved spinal anesthetic dissemination is not affected differently by saline or local anesthetic. The duration of EVE is also determined by the local anesthetic baricity and the timing of the epidural bolus. Intracetal spread is more noticeable when the epidural bolus is given soon after the spinal dose as opposed to when it is given more than 20 minutes after the spinal dose.¹⁰ The present study compared sequential combined spinal epidural anesthesia versus epidural volume extension in lower limb orthopaedic surgery.

We found that mean duration of surgery was 126.2 minutes in group I and 120.8 minutes in group II. The mean duration of motor block was 175.2 minutes in group I and 147.2 minutes in group II. Anesthesia readiness time was 20.1 minutes in group I and 18.5 minutes in group II. The mean modified Bromage motor score was 2 in group I and 1 in group II. Bhattacharya et al¹¹ in their study sixty patients aged 65 to 80 years, ASA III were randomly allocated into two equal groups. Group A (n=30) received sequential combined spinal epidural anaesthesia with 1 ml (5 mg) of 0.5% hyperbaric bupivacaine with 20 mg fentanyl through spinal route, and the expected incompleteness of spinal block was managed with small incremental dose of 0.5% isobaric bupivacaine through epidural catheter, 1.5 to 2 ml for every unblocked segment to achieve T10 sensory level. Group B (n=30) received spinal anaesthesia with 2 ml (10 mg) of 0.5% hyperbaric bupivacaine and 20 mg of fentanyl. Both the groups showed rapid onset, excellent analgesia and good quality motor block. Group A showed a significantly less incidence of hypotension ($p < 0.01$) along with the provision of prolonging analgesia as compared to group B. So sequential combined spinal epidural anaesthesia is a safe, effective, reliable technique with stable haemodynamic along with provision of prolonging analgesia compared to spinal anaesthesia for high risk geriatric patients undergoing major orthopaedic surgery.

We observed that number of patients who required pethidine was 6 in group I and 4 in group II. The mean pethidine consumption (mg) was 4.2 mg in group I and 3.3 in group II. The mean time for sensory regression to T12 was 134.2 minutes in group I and 123.2 minutes in group II. Supplementation with general anesthesia was 1 minute in group I and 2 minutes in group II, time to first request for postoperative analgesia was 225.6 minutes in group I and 190.1 minutes in group II. Sequential CSE and epidural block were compared for orthopedic and gynecological surgery by Gupta et al.¹² Forty ASA grade I and II patients, ranging in age from 20 to 60, were split into two groups at random. Using the "needle through needle technique," Group A participants underwent CSE and were administered 2.5 milliliters of 0.5% hyperbaric bupivacaine for spinal block. Patients in Group B underwent an epidural block with a catheter and 15 milliliters of 0.5% plain bupivacaine. To accomplish a block up to T4-5 in all patients, a further dosage of 0.5% plain bupivacaine (1.5–2 ml each unblocked segment) was given through the epidural catheter. In the CSE group, surgical analgesia and motor blockage happened much earlier. The CSE group experienced analgesia for 81.75 ± 11.09 minutes, which was significantly shorter than the epidural group's 120.75 ± 7.56 minutes. The total amount of bupivacaine required to attain the same target level was three times in epidural group. Compared to patients who received an epidural alone, Suzuki et al¹³ showed improved caudal dissemination of local anesthetic when the dura was perforated with a 26-gauge spinal needle before an epidural bolus.

CONCLUSION

Authors found that when patients are having lower limb orthopedic surgery, both the SCSE and EVE techniques found to be equally effective.

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